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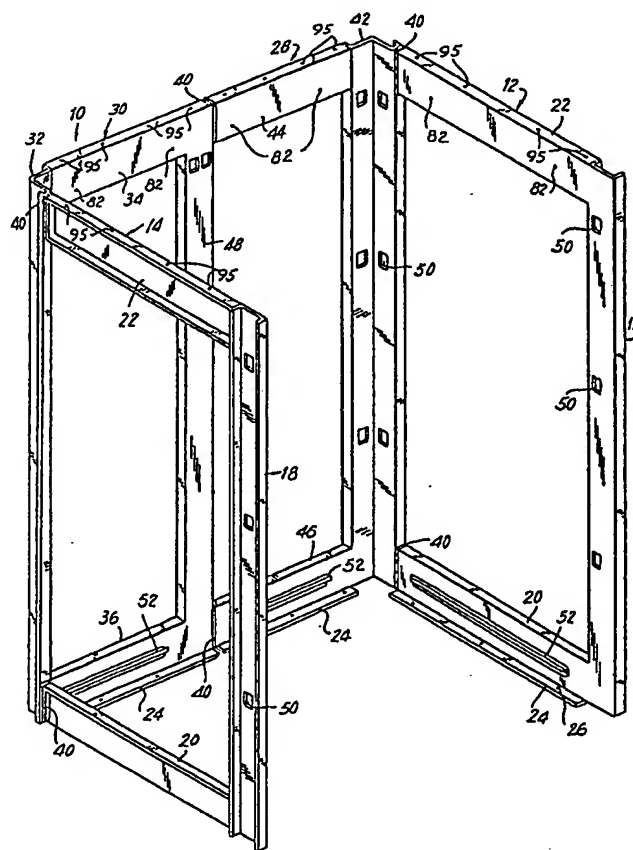
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(58) Field of search  
B8H

## (54) Elevator cab with hung panels

(57) The elevator cab comprises a lightweight metal open framework (10) comprising rear (28,30) and side wall panels (12-14). The side panels (12,14) are hingedly joined to the rear frame panels (28,30), and the rear frame has vertically oriented hinges (40) permitting inward folding of the rear frame between the side frames. When folded, the frame is a flattened package. In the unfolded state, decorative panels are hung from the framework to conceal the hinged joints and prevent the hinges from bending.

FIG. 1



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FIG. 1

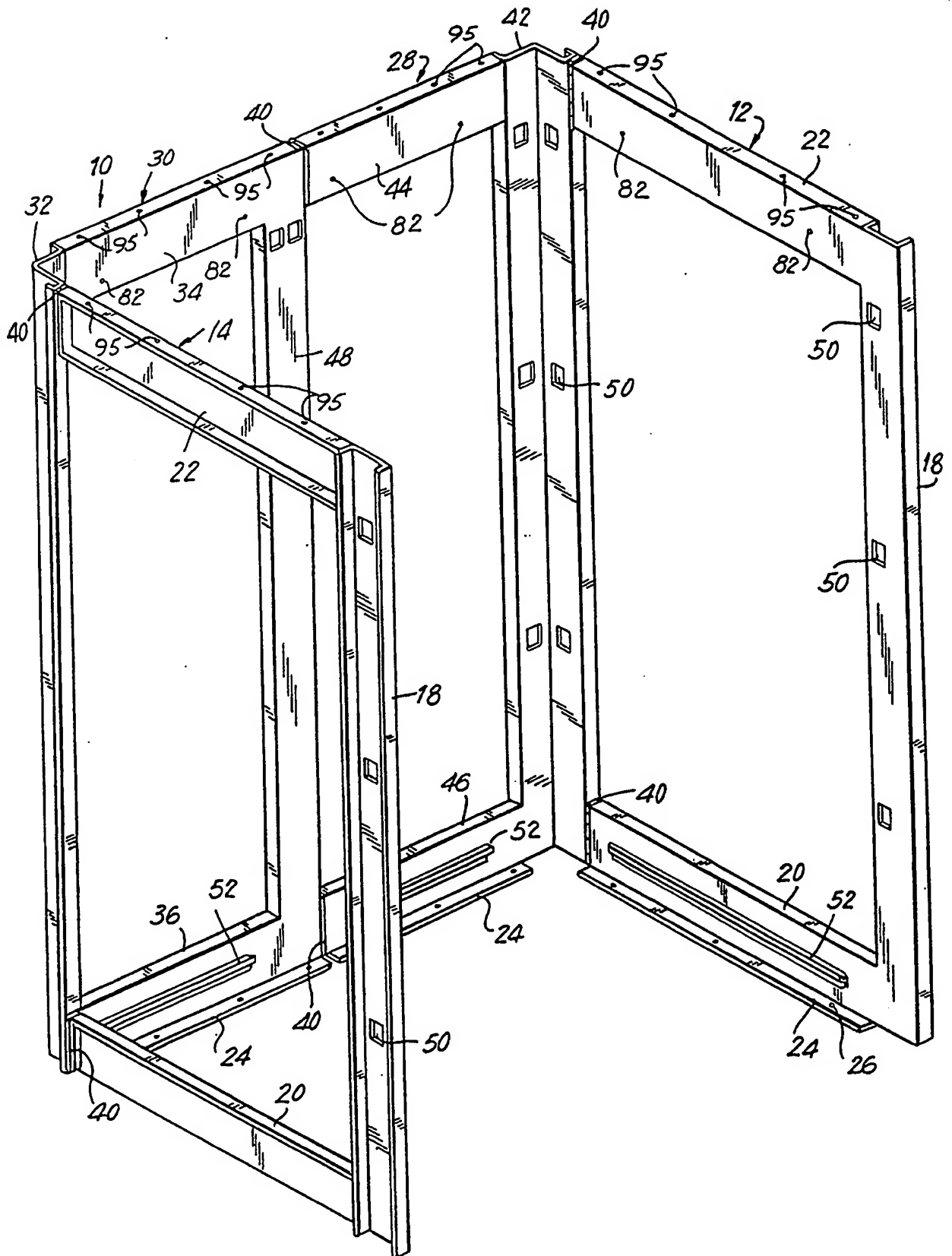


FIG. 2

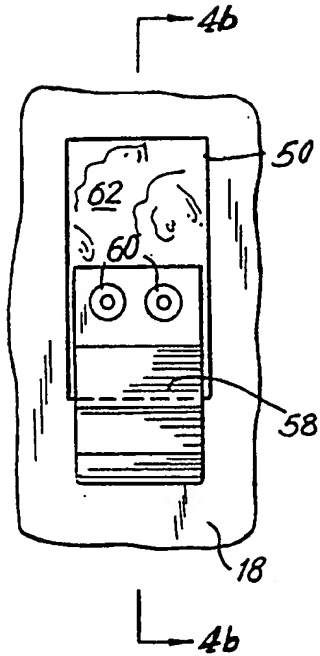
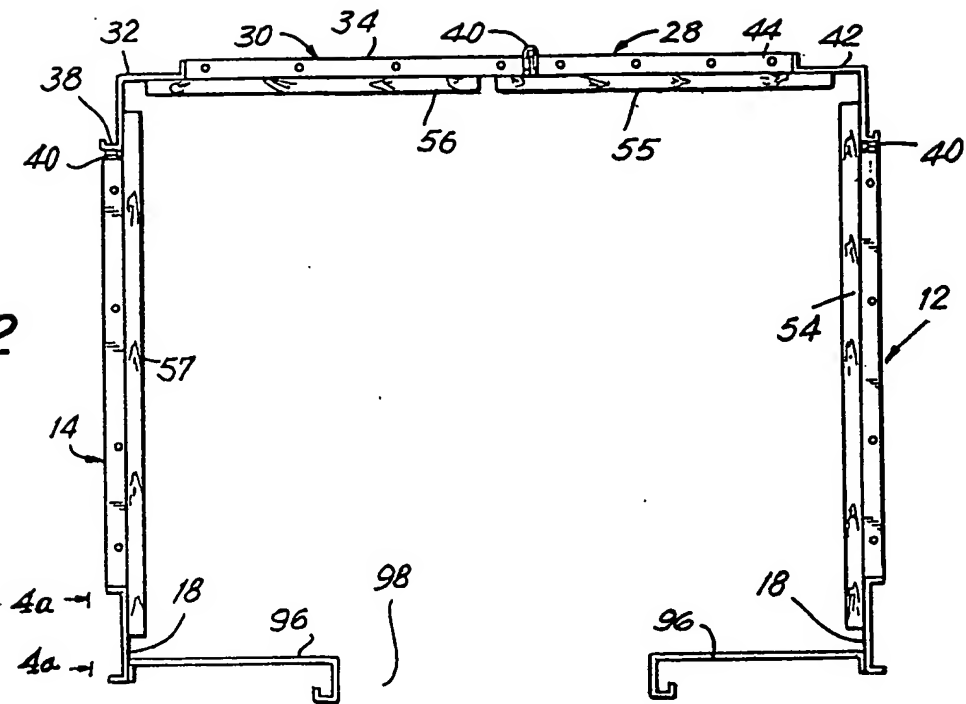


FIG. 4a

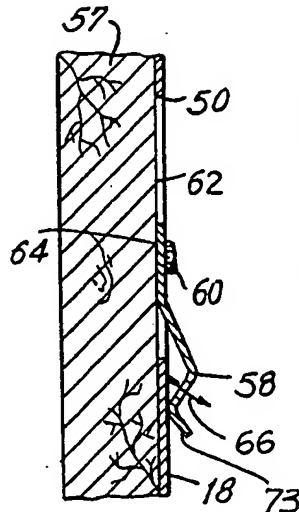


FIG. 4b

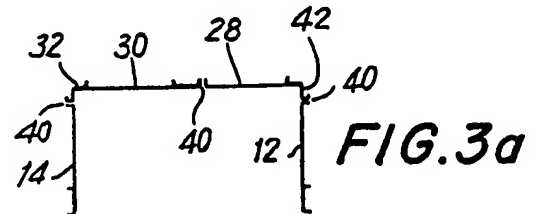


FIG. 3a

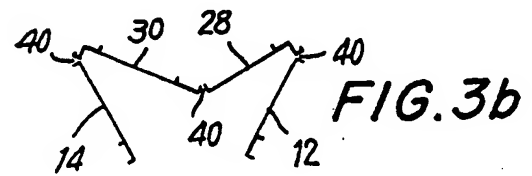


FIG. 3b

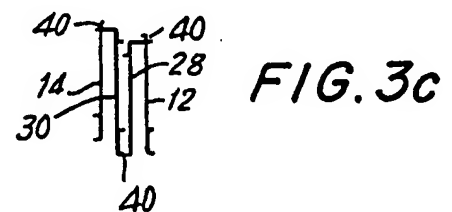
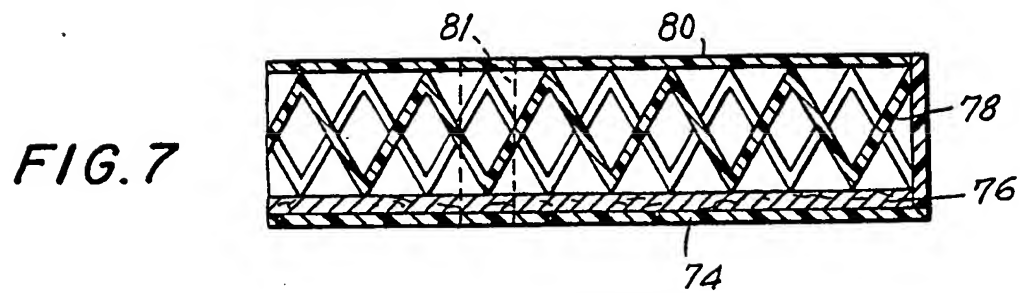
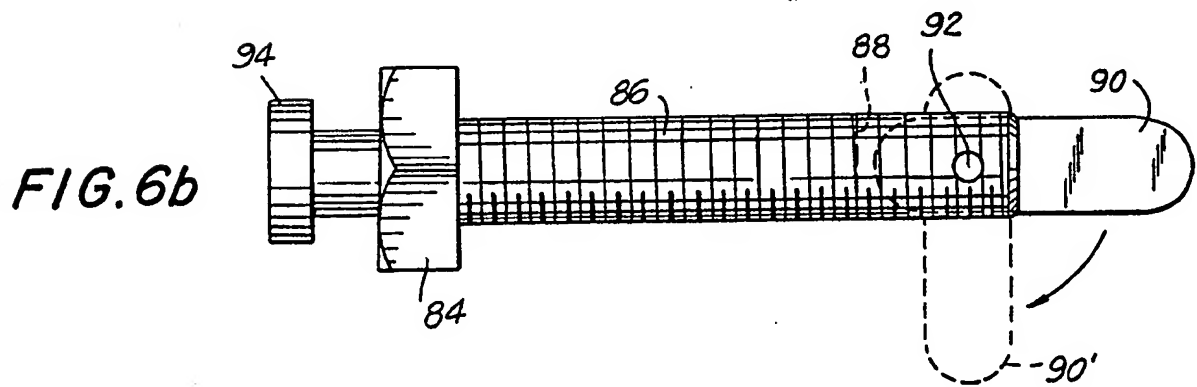
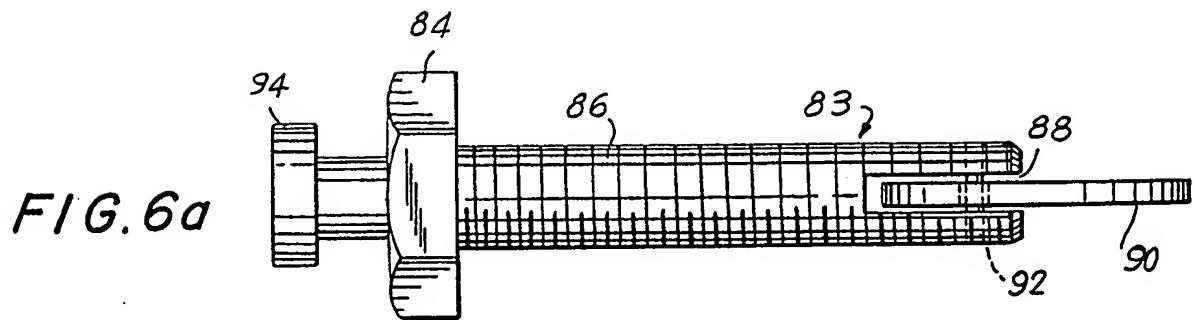
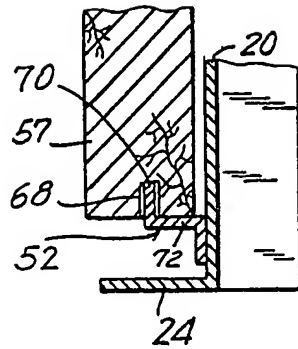


FIG. 3c



## SPECIFICATION

## Elevator cab with hung panels

5 *Background of the invention*

This invention relates generally to an elevator cab and more particularly to an elevator cab which is fabricated of hinged frame members having openings concealed by hung panels. A strong lightweight structure is provided. Rigid requirements are imposed by codes and regulations regarding the strength and load bearing capability of elevator cabs. In the prior art, platforms have been constructed of I-beams and channels joined together to form a framework to which a bearing surface is attached, and side walls have been formed of continuous, solid metal sheets or of laminated construction including a metal sheet. The panels which form the walls are fixedly joined together at the site after shipment in a knocked-down condition. Such a construction with solid walls is heavy, and additionally the solid walls make joining of the walls to the platform difficult because access to the fasteners is only available from outside of the cab. Further, the ceiling must be bolted to the side walls from outside the cab. Also, the heavy weight of the prior art construction raises the cost of an elevator installation especially in a hydraulic lift system.

What is needed is an elevator cab construction which is simple to fabricate, lightweight, meets all code and regulation requirements, is economical to ship, and readily assembled at the site.

*Summary of the invention*

Generally speaking, in accordance with this invention, an elevator cab construction of lightweight, high strength and attractive appearance is provided. The elevator cab comprises a lightweight metal frame providing structural support for rear and side wall panels. The side frames are hingedly joined to the rear frame members, and the rear frame has vertically oriented hinges permitting inward folding of the rear frame between the side frames. When folded, the frame is a flattened package which simplifies shipping and reduces shipping cost. In the unfolded state, panels hung from the frame conceal the hinged joints and also prevent the hinges from bending. Thereby, an attractive rigidized elevator cab wall construction which can be placed upon an elevator cab platform at the site for attachment thereto is provided. The side and rear frames include upper surfaces for supporting a ceiling panel as required and include cut-outs and lower panel supports for attachment and positioning of the panels. Attachment to the elevator cab platform and to the ceiling further rigidize the structure. Laminated panels including rigidized sheets meet code requirements and provide an attractive appearance with light weight. Use of special bolts prevent removal of hung appearance panels from within the elevator cab as regulations require.

In one broad form the invention provides an improved elevator cab having walls comprised of a metal frame concealed by hung appearance panels.

In its preferred form the hung panels are light in weight and the elevator cab with hung panels can be shipped in a knocked-down state and easily assembled at the site.

In other aspects the invention extends to bolts and hung panels.

An embodiment will now be described, by way of example only, reference being had to the accompanying drawings, in which:

Figure 1 is a top perspective view of the wall frames for an elevator cab with hung panels,

Figure 2 is a top view with parts omitted of an assembled elevator cab with hung panels,

Figures 3a, b, c are simplified top views to a smaller scale of the frame of Figure 1 in open, partially folded and folded states.

Figure 4a is a partial rear view of a panel attachment.

Figure 4b is a view taken along the line b-b of Figure 4a;

Figure 5 is a partial elevational view in section showing a panel support in accordance with the invention;

Figure 6a and 6b are top and side views respectively of a panel hanger bolt in accordance with the invention; and

Figure 7 is a partial cross-section view of a hung panel of Figure 2.

95 *Description of the preferred embodiments*

With reference to the Figures, a lightweight metal frame 10 for an elevator cab with hung panels in accordance with the invention includes a right-side frame 12, a left-side frame 14 and rear frames 28, 30. The side frames 12, 14 are basically flat structures in the form of a reversed letter C. In particular, each side frame includes a front post 18, base member 20 and top beam 22. As illustrated in Figures 1 and 2, the frame 12, 14 are constructed of channels and angles which are rigidly joined together in any suitable manner, for example, by welding. It should be understood that in alternative embodiments other basic structural shapes, for example, box members, can be used to constitute the members 18, 20, 22. Floor flanges 24 extend inwardly from the base members 20 and include holes 26 to allow for attachment of the metal frame of the elevator cab to an elevator platform (not shown).

The rear frame 28, 30 is comprised of two parts, the right side frame 28 being another reverse-C structure similar to of the side frames 12, 14, and a left side frame 30. The left side frame 30 is a reverse-C construction having the open end closed by a sheet metal corner post 32 which connects to a top beam 34 and a base member 36. The corner post 32 provides a flange 38 to which folding hinges 40 are joined near the top and bottom. The hinges 40 connect to the top beam 22 and base member 20 of the left-side frame 14 such that the left-side frame 14 can fold along the hinge 40 relative to the rear frame as best seen in Figures 3b, c. A corner post 42, similar in contour to the corner post 32, connects to top beam 44 and base member 46 of the rear, right-side frame 28, and hinges 40 connect the corner post 42 to the top beam 22 and base member

20 of the right-side frame 12 such that the right-side frame 12 folds relative to the rear frame 28 as best seen in Figures 3b, c.

The vertical post 48 of the rear left side frame 30 is hingedly connected to the top beam 44 and base member 46 of the rear right-side frame 28 by upper and lower hinges 40 such that the rear frames 28, 30 fold inwardly on the hinges 40 as best seen in Figures 3b, c.

The vertical members of the side and rear frames 12, 14, 28, 30, include cut-outs 50 on the interior surfaces of the members, that is, the surfaces which are within the space enclosed by the elevator cab. Further, a panel support 52 is rigidly connected to each of the base members 20, 36, 46. The cut-outs 50 and panel supports 52 position the hung panels which provide the appearance surfaces for the cab interior as explained more fully hereinafter.

Appearance panels 54-57 are suspended from the right-side frame 12, rear right-side frame 28, rear left-side frame 30, and left-side frame 14, respectively. The panels are sized so as to span the openings between the structural members of the side and rear frames both laterally and vertically. Clips 58 (Figure 4a, b) are attached at a plurality of positions by fasteners 60 to the back surfaces 62 of the panels 54-57 in positions such that each clip 58 may be aligned with a cut-out opening 50 on the associated frame member. In cross-section (Figure 4b) the clip 58 is formed as a somewhat elongated S with the fasteners 60 holding an end surface 64 of the clip 58 against the back surface 62 of the panel to form a cantilever connection. Resiliency of the clip 58 allows for flexing about the fasteners 60 as indicated by the arrow 66.

The lower edge of each panel includes a vertical slot 68 for engagement with the vertical flange 70 on the panel support 52.

To attach a panel, for example panel 57, to the frame, for example frame 14, the clips 58 are aligned with the associated cut-outs 50 on the frame. Then the clip 58 is passed through the associated cut-out 50 and the panel is translated downwardly, sliding on the surfaces of the metal frame such that the metal frame slips between the free end 73 of the metal clip 58 and the panel itself (Figure 4b). The panel comes to rest when the vertical flange 70 of the panel support 52 is fully recessed in the slot 68 at the bottom end of the panel. The end of the panel rests on the horizontal surface 72 of the panel support 52. Thus, unless moved vertically, the panel is constrained from being removed. However, the panel is still removable by raising the panel to clear the vertical flange 70 on the panel support 52 and aligning the clips 58 with the cut-out openings 50. Then the panel is readily removed from the frame.

In keeping with an objective of light weight, the appearance panel (Figure 7) is a lamination including a decorative facing 74, for example, formica, or other plastic laminate, or a mirror finish plastic or the like. This facing 74 is mounted on a protective sheeting 76 for example, tempered masonite. A core 78 of the panel is a honeycomb of plastic, paper or other lightweight material. A backing 80, joined to the core 78, provides a hard surface.

such as, for example, formica or other plastic laminates.

Regulations and codes for passenger elevator cabs frequently require that the panels 54-57 not be removable from within the elevator cab. Thus, in addition to the clips 58 and panel support 52, bolts 83 are provided which pass through clearance holes 81 in the panels 54-57 and engage in holes 82 in the inner frame surfaces. The bolts 83 are provided with an enlarged head 84 and a body 86 having a slot 88 cut in the far end thereof. An elongated tab 90 fits within the slot 88 and is mounted on a pin 92 which spans the slot 88 and is journaled in the body 86. While the elongated tab 90 is aligned to the longitudinal axis of the bolt, the bolt 83 is inserted through the clearance hole 81 in the panel, through the hole 82 in the frame, and when sufficiently inserted and rotated, the elongated tab 90, under the force of gravity, pivots downwardly about the pin 92 to the position 90' indicated with the broken lines. Therefore, the tab 90 extends radially beyond the body 86 and it is no longer possible to withdraw the bolt 83 from the holes 81, 82 in the frame or panel while the tab is pivoted downward. It is not possible from within the elevator cab to remove the panels.

In order to protect the decorative facing 74 when objects such as furniture are moved within the elevator cab, soft pads are frequently hung to protect the cab wall surfaces. For this purpose, the bolt 83 is provided with a pad button 94 which is extended from the more conventional head 84 of the bolt. Pads are suspended from the pad buttons.

It should be understood that the bolt 83 may have sheet metal type threads and the holes 82 in the frame members may be unthreaded. Also, the bolt may have machine-type threads and the holes 82 in the frame members may be tapped with mating threads, or a weld nut, for example, may be attached to the back surface of the frame member for engagement with threads on the bolt. In an alternative embodiment neither the bolt nor the holes are threaded and only the action of the clips 58, panel support 52, and the downward position 90' of the bolt tab prevent the panels from being removed from within the elevator cab. Once the panels are held by the bolts 83, they are not removable except by action externally of the elevator cab to bring the tab 90 once again into longitudinal alignment with the body 86.

The advantages of an elevator cab with hung panels in accordance with the invention are many. The construction is light in weight because solid metal panels have been eliminated from the walls in favor of a substantially open framework structure and the hung panels. The frames 12, 28, 30, 14 can be hinged together at the factory and shipped in the folded condition as illustrated in Figure 3c. On the other hand, the frame can be shipped as separate frame members 12, 14, 28, 30 for assembly in the field. After the frame is unfolded (Figure 1), it is placed on an elevator platform (not shown) and fixedly attached thereto by bolts passing through the holes 26 in the floor flanges 24. This rigidizes the structure. A ceiling panel (not shown) can be placed folded structure and attached thereto

using bolts that engage in holes 95 in the flanges in the top beams 22, 34, 44. This further rigidizes the structure. As illustrated in Figure 2, front panels 96 connect to both front posts 18 leaving only a door opening 98.

It should be noted (Figure 2) that the side panels 54, 57 extend beyond each hinged joint 40 such that when the panels 54, 57 are positioned on the respective frames 12, 14, it is not possible to bend the associated hinge 40. The structure is rigidized even when the ceiling panel (not shown) is not in place and the walls are not attached to the elevator platform (not shown).

Similarly, the panel 55 extends over the hinge 40 in the rear wall of the elevator cab. It should be noted, that the hinge 40 between the rear frames 28, 30 is not centered and the panel 55 both conceals the hinge 40 and also rigidizes the hinged joint against bending while the panel is connected to the frame. When the elevator cab is assembled and the panels hung, no hinges are visible and all cut-outs 50, mounting holes 82 and panel supports 52 are concealed. A seamless appearance is presented to view.

During construction work, before the elevator is put into conventional usage, for example, as a passenger elevator, the cab can be used for moving structural materials, furniture, etc. For this purpose, the panels are reversible so long as the bolts 83 are not inserted or access to the bolts 83 is available externally of the cab. Also, in assembling the elevator cab, the connections between the frame members and the elevator platform can be made both from within and outside of the cab since the frame has an open structure. Similarly, the ceiling panel can be attached to the frame either from inside or from outside of the cab, again as a result of the open frame structure. This is not possible where, as in prior art elevator cabs, the wall panels are of solid metal construction. Thus, a lightweight cab is achieved which is attractive in appearance, easy to manufacture, ship and assemble on site.

#### CLAIMS

1. An elevator cab having at least a right side wall, left side wall and rear wall, comprising:  
a first frame having a first base member for resting on a platform, a first top member suitable for supporting a ceiling panel thereon, first structural means connected between said first base member and said first top member maintaining a fixed physical relationship between said first members, said first frame being substantially open in face area,  
a second frame having a second base member for resting on said platform, a second top member suitable for supporting said ceiling panel thereon, second structural means connected between said second base member and said second top member maintaining a fixed physical relationship between said second members, said second frame being substantially open in face area,  
a third frame having a third base member for resting on said platform, a third top member, third structural means connected between said third base

member and said third top member maintaining a fixed physical relationship between said third members, said third frame being substantially open in face area,

said first and second frames being joined to said third frame along vertical edges thereof to form said left side, right side and rear walls.

2. An elevator cab as claimed in claim 1, wherein said first and second frame members are joined to said third frame member by hinges, said joined frame members being foldable along the hinged joints.

3. An elevator cab as claimed in Claim 2, wherein said third base member is formed in two portions, the first portion being hingedly connected to the second portion, and said third top member is formed in two portions, the first portion being hingedly connected to said second portion, said third frame being foldable along said hinges in said third members, said right side wall, left side wall and rear wall being foldable, accordion style, about three hinge-pivoting axes, said three frames being substantially parallel when said cab is folded.

4. An elevator cab as claimed in any of Claims 1 to 3 comprising a plurality of panels, at least one said panel being suspended from each said frame, each said panel substantially concealing the associated frame from view from one side of said frame.

5. An elevator cab as claimed in Claim 4, wherein said hung panels conceal at least a portion of each said hinge joint.

6. An elevator cab as claimed in any of Claims 1 to 5, wherein said first, second and third structural means include at least one vertical post, said joints between said first frame and said third frame and said second frame and said third frame each including at least one of said vertical posts.

7. An elevator cab as claimed in Claim 6, wherein at least said posts include cutout openings, and further comprising clips attached to the backside of said panels, said clips being inserted in said cutout openings and engaging the associated structure, said engaged clips holding said panels to said associated structure.

8. an elevator cab as claimed in Claim 7, and further comprising a slot along the lower edges of said panels, and panel support members, one said panel support member being connected to each said base member and having a vertical surface extending therefrom, said vertical surface engaging in said panel slot, said panel support limiting the vertical position of said panels relative to said frames.

9. An elevator cab as claimed in Claim 4 or any claim dependent thereon and further comprising holes through said panels at least near the upper edges thereof; and holes in said top members, and bolts passed through said holes in said panels and said top members and holding said panels to said frame.

10. An elevator cab as claimed in Claim 9, wherein each said bolt comprises a bolt head connected to a bolt body, said body having a slot formed in the end thereof, and an elongated tab, said tab being pivotably mounted in said slot, said tab being subject to pivoting downward externally of

said elevator cab behind the associated frame, said bolt being non-removable from within said elevator cab when said bolt is holding a panel to said associated frame and said tab is in said downward pivoted position, whereby said panels are not removable from said frame from within said elevator cab.

11. An elevator cab as claimed in Claim 4 or any claim dependent thereon, wherein said panels are a laminated construction comprising a decorative facing mounted on one side of a protective sheet, the other side of said sheet being mounted on one side of a core, the other side of said core having a rigid backing.

12. An elevator cab substantially as described herein with reference to or as illustrated in the accompanying drawings.

13. A bolt, comprising:  
a bolt head;

a bolt body connected to said head, said body having a slot formed in the end thereof;  
an elongated tab, being pivotably mounted in said slot and extending therefrom, said tab being subject to pivoting at an angle to the longitudinal axis of said body under the influence of gravity, said tab when pivoted, extending radially beyond said body, said bolt after pivoting being non-removable without access to said tab from a hole through which it is passed and rotated.

14. A bolt substantially as described herein with reference to or as illustrated in the accompanying drawings.

15. A panel for an elevator cab comprising:  
a decorative facing mounted on one side of a protective sheet, the other side of said sheet being mounted on one side of a lightweight core, and a rigid backing connected to the opposite side of said core.

16. An elevator cab panel as claimed in Claim 15, wherein said decorative facing is of formica, said protective sheeting is masonite, said core is a honeycomb of one of paper and plastic, and said backing is formica.

17. An elevator cab panel substantially as described herein with reference to or as illustrated in the accompanying drawings.